

Alaska Regional Refuge Inventory and Monitoring Strategic Plan

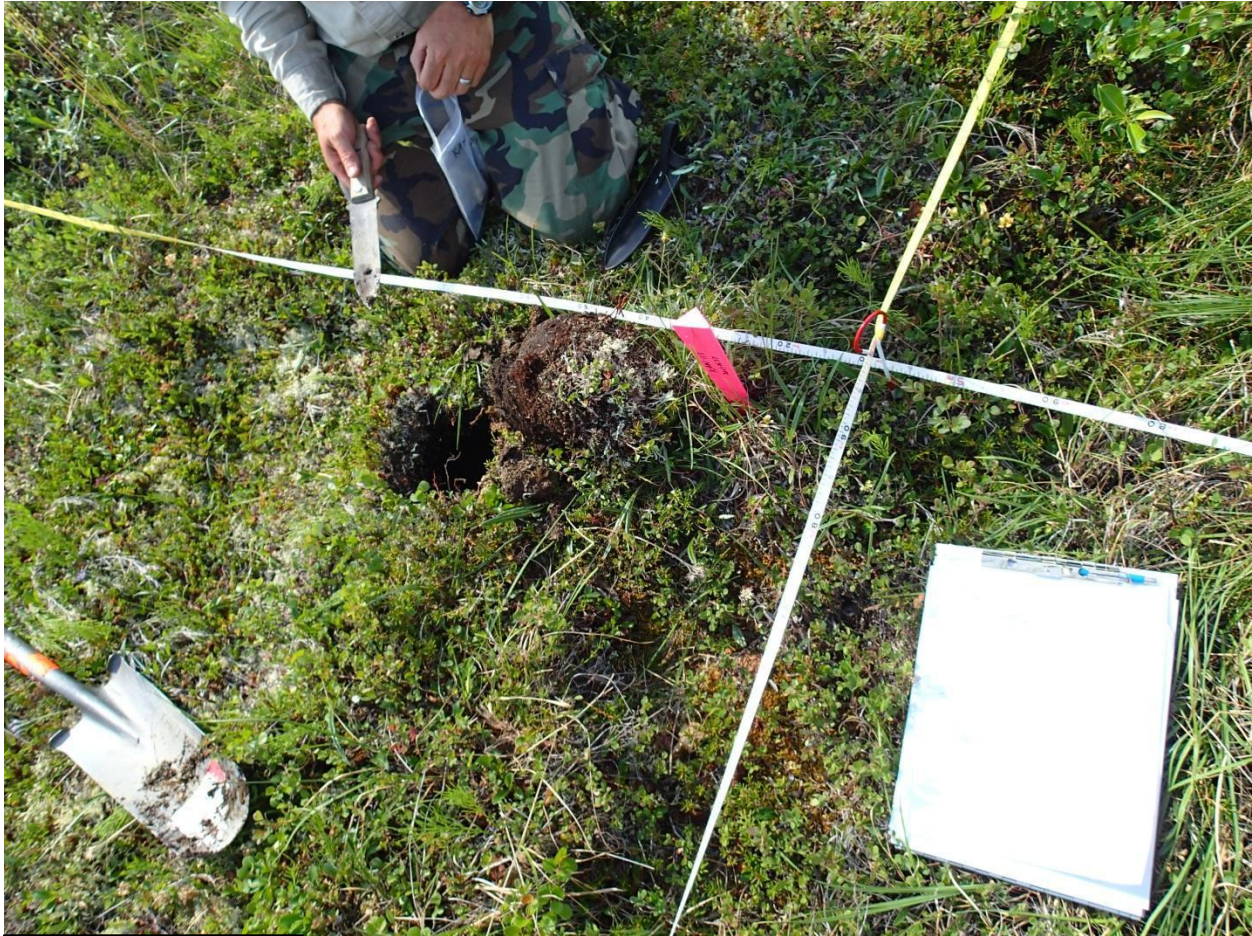


Photo: R. Liebermann USFWS

US Fish and Wildlife Service
National Wildlife Refuge System
Alaska Region
Inventory and Monitoring Branch
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Alaska Regional Refuge Inventory and Monitoring Strategic Plan

Signatures

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Introduction

The National Wildlife Refuge System (NWRS) of the US Fish and Wildlife Service (FWS or Service) was created to sustain and restore healthy wildlife populations and the habitats upon which they rely. Similarly, the Alaska National Interest Lands Conservation Act (ANILCA) established refuges and other public land units to maintain wildlife populations and to preserve ecosystems in an “unaltered” state (PL 96-487, §101(b)). Our mission is increasingly challenged by local, regional, and global threats. We rely more than ever on sound science to inform questions regarding management of refuge wildlife and ecosystems in a rapidly changing world.

Congress funded the NWRS Inventory and Monitoring (I&M) program in 2010 to address mission-critical information needs for effective conservation in the face of climate change and growing threats from other environmental stressors. The NWRS I&M program is a nationally coordinated effort to support scientifically credible inventory and monitoring surveys at refuge, landscape, regional, and national scales. Understanding ecosystems and wildlife populations requires a broad-scale perspective, yet the scope of refuge inventory and monitoring studies seldom extends beyond refuge boundaries. An efficient, coordinated approach is needed for data collection, data management, analysis, and reporting across the >560 units of the NWRS. Despite the extensive skillset and high performance of refuge biologists, refuge-based science needs additional, specialized technical capacity in survey design, data management, and analysis, especially for large-scale studies.

The *Strategic Plan for Inventories and Monitoring on National Wildlife Refuges: Adapting to Environmental Change* ([USFWS 2010a](#)) and *Operational Blueprint for Inventory and Monitoring on National Wildlife Refuges: Adapting to Environmental Change* ([USFWS 2010b](#)) established five overall goals (Appendix A) for the I&M program and identified specific tasks to be completed in the initial phase. The I&M Coordination Team (IMCT), comprised of each Regional I&M Coordinator and the three I&M leads at the Natural Resource Program Center in Ft. Collins, is responsible for coordinating and implementing these goals and tasks at the national level (*Inventory and Monitoring 7-Year Plan: 2013-2020*, [USFWS 2013a](#)).

The IMCT also revised the NWRS I&M Policy ([USFWS 2014](#)) and developed guidance for its implementation. The policy was written to assure that refuge surveys (1) meet the highest priority refuge management information needs, (2) are fully implemented from planning through data management, analysis and reporting, and (3) are well documented with complete protocols.

The I&M program addresses recommendations from *Conserving the Future* ([NWRS 2011](#)). The I&M program leads Recommendation 7: institutionalizing a nationally coordinated inventory and monitoring program and developing state-of-the-art data management systems. We also support adaptive management (Recommendation 6), reporting on the status of the NWRS (Recommendation 8), and are clearly linked to planning (Recommendations 1 and 4), climate change (Recommendation 2), research (Recommendation 9), and the science community (Recommendation 10). I&M staff coordinate among regions to implement national priorities at regional and local scales.

Each FWS Region was allowed six I&M FTEs in 2010, with regional buildout from that base in subsequent years. The Alaska I&M Branch was initiated with an I&M regional coordinator/branch chief, two regional data managers, and three I&M biologist positions at refuge field stations. The program has grown since then (Appendix B - Staffing, Appendix C - Timeline and history). In six years, we have learned much about needed support for sound science to inform managing conservation challenges on Alaska refuges. This experience, combined with guidance from the national I&M effort, was used to develop a strategic path forward.

The Alaska I&M Strategic Plan

The Alaska I&M team developed this plan to provide the vision and objectives that will guide I&M staff activities and funds. We established the objectives based on direction from the national I&M initiative, the NWRS vision, and recommendations in *Conserving the Future* ([NWRS 2011](#)). We looked to our own experience with Alaska refuge science needs, and obtained input from refuge managers and biologists. We will support the recently established Alaska NWRS objective of ensuring the use of science to inform management actions (Region 7 NWRS Priority Setting and Strategic Planning Meeting, October 31 – November 4, 2016, Anchorage). We will develop specific actions for the next 5 years (2018-2023) in an Implementation Plan, providing the basis for annual work plans and budgets. This will ensure activities and budget expenditures are transparent, prioritized, and will clarify staff roles and responsibilities.

To develop this Strategic Plan, we used a facilitated, structured approach, with periodic input and review from the field and regional refuge leadership (Appendix D). Our approach included 1) developing a vision and a conceptual model of how I&M supports refuge science and management; 2) identifying broad goals and objectives based on national guidance and observed refuge needs; 3) identifying general strategies to address each objective; and 4) acknowledging the dynamic nature of the process by committing to development of a 5-year Implementation Plan and annual work plans.

Vision

*Collaborative ecosystem science to inform National Wildlife
Refuge System conservation decisions in Alaska.*

The ideas expressed in the vision are not new to refuges in Alaska. The immensity and diversity of Alaska refuges and relative paucity of conservation scientists in Alaska has made partnering a necessity. We emphasize collaboration: refuges sharing staff and expertise, working with together and with partners to achieve greater consistency and efficiency. We are fortunate to be working in largely intact systems which facilitates an ecosystem approach. We also must ensure that refuge surveys are relevant to refuge management decisions at multiple scales, and thus emphasize our role in science for the System.

Conceptual Model

To ensure a common understanding of the role of refuge science in general, and the I&M program specifically, we developed a conceptual model to illustrate key components and relationships (Fig. 1). The **I&M team** can assist with eliciting **explicit and documented refuge management priorities**. Documented management priorities and SMART objectives lead to **prioritized surveys for critical management information needs** provided in refuge Inventory and Monitoring Plans (IMP). Once plans are approved, the **I&M team** assists as needed with survey design, data management, and data analysis aspects of **protocol development**, following the guidance established in the Protocol Survey Handbook ([USFWS 2013b](#)). Regular **reporting** is essential to maintaining the vitality of surveys and for **internal communication** among refuge staff and **external communications** with our partners. Based on management information needs, we can use **I&M funds** to support **collaborative projects**, especially to advance refuge **understanding of landscape context, ecosystem functions, and threats**. This understanding helps refuge managers make informed, **proactive management decisions** to **maintain and restore wild, intact, and resilient landscapes and ecosystem processes** – our ultimate goal for refuges as articulated at the Region 7 NWRS strategic planning meeting (Oct 31-Nov4, 2016, Anchorage). Understanding of ecosystems and landscape context also informs management priorities, providing a feedback loop as we gain knowledge.

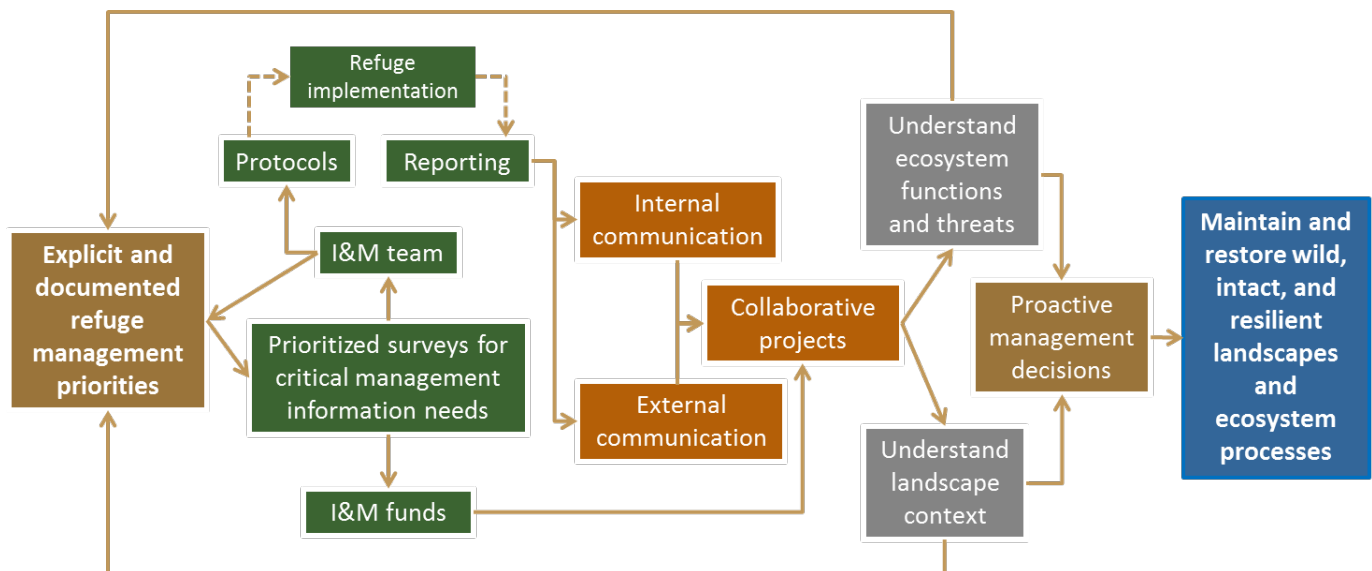


Figure 1. A conceptual model of the role of science and I&M in the NWRS. The I&M Branch works with refuge staff to develop scientifically sound surveys to address priority management information needs.

Goals and Objectives

We developed our goals and objectives by discussing our values and organizing them into logical categories that address national NWRS and I&M goals (see Plan Development, Appendix D). We identified an overarching goal, five supporting goals, and nineteen objectives that will help meet the broader goals. We developed an *objectives hierarchy*, which is a graphic, abstracted version of the objectives to help visualize how they fit together (Fig. 2). Our goals and objectives are the most important part of the I&M Strategic Plan, as they will drive I&M program priorities and actions, including use of discretionary funds. SMART (Specific, Measurable, Achievable, Results oriented, Time-specific) objectives will be developed in the 5-year Implementation Plan.

Overall Goal:

Support regional and national inventory and monitoring efforts to promote ecosystem science that informs conservation and management of Alaska National Wildlife Refuges.

Supporting Goals:

Decision Support. Provide technical assistance and products to support management decisions.

Science Rigor. Ensure scientific rigor and consistency in refuge surveys.

Data Management. Ensure access to survey information for management, staff, and the public.

Project Coordination. Increase efficiency through collaboration on I&M surveys with partners within and outside the Service.

Communication. Maximize transparency, credibility, awareness, and accountability of Alaska I&M among refuges, other FWS programs, our partnering organizations, and the public.



Photo: D. Granfors USFWS

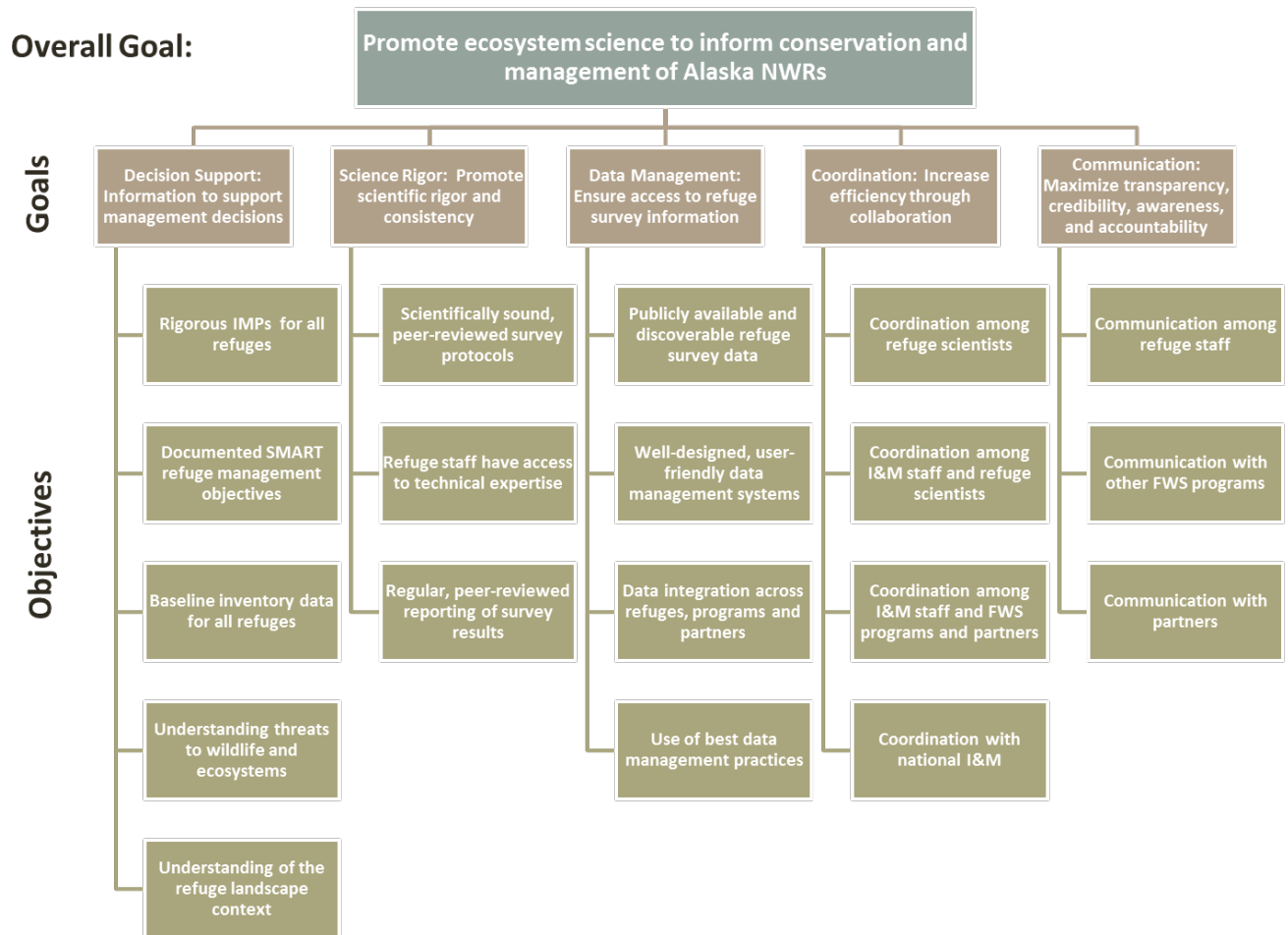


Figure 2. The Alaska I&M objectives hierarchy arranged from broad goals to specific objectives, illustrating a path by which our overall goal will be met. (Goals and objectives are paraphrased for space.)

Goal 1 – Decision Support: Provide technical assistance and products to support management decisions.

National Wildlife Refuge managers are decision makers. Using available information, they decide how best to manage the wildlife and ecosystems on the lands and waters they are tasked with conserving. Decision support is needed at both the local refuge scale to address refuge-specific management questions, and at landscape scales to address broader concerns. Providing managers with products and tools for decision support will result in more informed decisions.

As a public land management agency, we need to ensure that survey activities address the highest priority information needs. On refuges, IMPs explicitly link surveys to management objectives. Developing rigorous IMPs for refuges is a priority for the I&M program. The national I&M team has developed guidance based on the revised policy ([701 FW 2](#)) to provide consistency in IMPs across the NWRS, but it is the responsibility of regional staff to engage and assist refuges with IMP development.

IMPs are based on wildlife and ecosystem management objectives that conform to SMART criteria. Such objectives take time and critical thought. These objectives create a solid foundation for a robust IMP and biological program. I&M staff can provide additional resources to assist with the objective-setting process (e.g., facilitating processes such as Identifying Resources of Concern ([Paveglio and Taylor 2010](#)) and the Open Standards for the Practice of Conservation ([Conservation Measures Partnership 2013](#))).

Refuge management relies on basic inventories of biotic and abiotic resources to provide a baseline for understanding ecosystems. Recommendation WH8.1 ([USFWS 2004](#)) lists the priority data that each refuge should have. In Alaska, the urgency to fulfill the severe shortage of baseline data is more important than ever to provide a context for what lies ahead in this period of rapid ecological change. A symposium held in Girdwood in 2009 for ecoregional monitoring ([Woodward and Beever 2010](#)) identified additional inventory needs specific to Alaska.

Alaska refuges comprise some of the most pristine ecosystems in the world, yet climate change, invasive species, contaminants, development, and other factors threaten their stability. Addressing these threats requires understanding beyond refuge boundaries to the surrounding landscape. Recommendation 1 of *Conserving the Future* ([USFWS 2011](#)) wants us to ensure that future refuge plans “view refuges in a landscape context and describe actions to project conservation benefits beyond refuge boundaries.” The Strategic Habitat Conservation approach ([National Ecological Assessment Team 2006](#)) explicitly recognizes this by advocating for landscape scale conservation designs to guide our management activities. The conceptual models for Alaska refuges report ([Woodward and Beever 2011](#)) can help identify critical ecosystem components for detection of regional change. Understanding the landscape context will help identify which ecosystems and wildlife populations are of highest concern, which refuges have stewardship responsibility for those resources, and refuge-specific threats.

Decision Support Objectives and Strategies

- ❖ Objective: Increase the rigor of refuge Inventory and Monitoring Plans.
 - Strategy: Develop and implement a standardized process to evaluate a refuge's preparedness to develop an IMP (e.g., documented priorities, complete PRIMR records, etc.).
 - Strategy: Assist refuge staff with development of Inventory and Monitoring Plans that meet the requirements of the Refuge Inventory and Monitoring Policy ([701 FW 2](#)).
- ❖ Objective: Increase the number of refuges that have documented SMART wildlife and ecosystem management objectives.
 - Strategy: Develop and implement a process to help refuges assess and document their priority conservation targets.
 - Strategy: Develop and implement a process to assess and develop SMART refuge objectives specific to their highest priority conservation targets.
- ❖ Objective: Increase baseline inventory data for defined, key biotic and abiotic resources to meet refuge needs, especially with regard to climate change and vulnerability assessment needs.
 - Strategy: Work with refuge staff to identify high-priority biotic and abiotic inventory data needs.
 - Strategy: Work with refuges and partners to obtain high-priority inventories.
- ❖ Objective: Increase understanding of the impact of key threats or stressors on refuge species and ecosystems at local and landscape scales.
 - Strategy: Use and build on existing information to develop landscape- and refuge-scale models of the greatest threats to refuge wildlife and ecosystems.
 - Strategy: Assess the current status, threats, and information needs for water resources on refuges.
 - Strategy: Assess the vulnerability of refuge wildlife and ecosystems to climate change and other stressors to inform refuge planning and specific management strategies and actions.
 - Strategy: Develop and implement a framework to support strategic and adaptive invasive species management of refuge lands.
- ❖ Objective: Increase the availability of spatially explicit tools and products that promote refuge staff understanding of the landscape context of refuge wildlife and ecosystems.
 - Strategy: Support discovery and dissemination of existing spatially explicit data, models, and decision support tools.
 - Strategy: Work with partners to obtain spatially explicit data and develop new models and tools that indicate refuge stewardship responsibilities and contributions to the conservation estate.

Goal 2 – Science Rigor: Ensure scientific rigor and consistency in refuge surveys.

The NWRS is a science-based organization that subscribes to the highest standards of scientific integrity. We reflect this commitment in the design, delivery and evaluation of surveys and research. Rigorous science is dependent on maintaining a workforce of highly skilled scientists.

A successful inventory or monitoring survey generates statistically rigorous, repeatable, and sharable data that addresses an *a priori* objective ([Reynolds et al. 2016](#)). Failing to meet this benchmark results in wasted time, money, and effort, and failure to meet the stated objective. Peer-reviewed survey protocols increase the probability that the collection and analysis of data are reliable and appropriate to address the intended objective. Standardized protocols also facilitate comparison and utility of data over time by providing the means to repeat surveys in a consistent manner. To guide refuge scientists in creating standardized survey protocols, I&M developed the *Survey Protocol Handbook* ([USFWS 2013b](#)).

Many Alaska refuges operate with a small biological staff who are expected to perform multiple roles (e.g., GIS expert, statistical knowledge, management planning support). Designing and implementing studies that address natural resource management questions requires proficiency in survey design, statistical theory, and data analysis. These skills are complex and highly dynamic, requiring regular access to tools, resources, and training for refuge scientists to maintain their competence. New threats can require novel training, and relevant skills change with technology. Meeting this need can be a challenge in Alaska, where travel to professional conferences and trainings is expensive. All these factors highlight the need for effective, relevant, and local training opportunities.

Scientists conducting surveys in Alaska face many of the challenges typical of those working in the contiguous 48 states, as well as additional challenges. Difficult access to remote refuges in Alaska hinders survey efforts. Many of today's technical and analytical tools rely on network connectivity, but slow or nonexistent internet connectivity limits their efficacy on many Alaska refuges. Both I&M and refuge biologists must constantly seek novel approaches to meeting the challenges of rigorous science in remote locations.

Reporting survey results is a fundamental component of scientific rigor. Synthesizing our data into reports will better inform our management actions. All this occurs under limited and declining operating budgets, further increasing the demand for efficient and effective science-based conservation and management.

Science Rigor Objectives and Strategies

- ❖ Objective: Assist refuge staff with development of scientifically sound, peer-reviewed survey protocols.
 - Strategy: Promote and assist refuge use of the Monitoring Roadmap ([Reynolds et al. 2016](#)) and Survey Protocol Handbook ([USFWS 2013b](#)).
 - Strategy: Maximize the availability of, and access to, tools and resources for protocols that meet peer review standards as prescribed by protocol handbook.
 - Strategy: Capitalize on existing peer-reviewed protocols.
- ❖ Objective: Maximize scientific technical skills among refuge staff and increase access to technical expertise and tools.
 - Strategy: Provide technical consultations in all areas of I&M staff expertise to facilitate accomplishment of refuge science goals.
 - Strategy: Seek new or collate existing expertise and tools in response to unmet refuge technical science needs.
 - Strategy: Conduct, advocate for, and fund cross-programmatic technical training sessions via multiple platforms.
 - Strategy: Respond to identified refuge needs for GIS assistance, including spatial data management and analysis.
 - Strategy: Foster partnerships between non-refuge technical experts and refuge scientists.
- ❖ Objective: Facilitate internal and external accessibility of refuge science products to a range of audiences including the public.
 - Strategy: Maximize our effective support of peer-reviewed reporting of survey results by refuge staff.
 - Strategy: Improve existing and seek innovative approaches to communicate refuge science to the public.



Goal 3 – Data Management: Ensure access to survey information for management, staff, and the public.

Obtaining quality data that meets rigorous scientific standards often requires expending considerable resources. Limited resources can be used most effectively by ensuring that any information collected be used for as many purposes as possible. Increased awareness of the value of data has led to the development of National ([OMB memo 2013](#)) and Department of Interior policies stating that data be treated as an enterprise asset and specifically requires FWS to manage data in a manner that the “Data will be sharable, discoverable, accessible, and reusable to ensure the value of data is realized” ([378 DM 1.7.B.1, DOI 2016 draft update](#)).

Good data management practices are a key component required for rigorous science, living up to our principles, and complying with current policies. The need for improved data management and the importance of ensuring that data are retained for others to find, understand, and reuse has been a priority of the FWS for over a decade. Retaining and reusing of data was identified in *Fulfilling the Promise* ([USFWS 1999](#)) Recommendation WH 9, which advocates developing or using existing databases to store data for individual refuge use as well as linking to regional and national databases where appropriate. Similarly, *Conserving the Future* ([USFWS 2011](#)) advocates sharing data to communicate within the NWRS (Recommendation 15) and to integrate with the broader scientific community (Recommendation 7). Adaptive management projects require long-term access to data, often beyond the period of active participation by the original investigators.

We have made advances with several national data systems (PRIMR, WRIA); however, refuge staff often need support for local data to be incorporated into the broader systems. Proper data management and associated support ensure that refuge scientists can contribute to national I&M databases and other data sharing efforts. Many refereed journals now require that data be documented and archived prior to manuscript publication. The current industry best practice will be used as a standard when evaluating the quality of Service data and data management practices during litigation. These practices must be followed if the Service intends to produce scientifically credible and legally defensible data.

Data Management Objectives and Strategies

- ❖ Objective: Maximize retention, public availability, and discoverability of refuge survey data.
 - Strategy: Develop, promote, and assist with the use of databases that provide or link to publicly searchable sites to store refuge related documents.
- ❖ Objective: Increase the number of refuge surveys that have well-designed, user-friendly data management systems.
 - Strategy: Develop and assist with the use of regional data management systems.
 - Strategy: Promote awareness of and provide training for FWS data management systems (e.g., PRIMR, ServCat).
- ❖ Objective: Promote and facilitate data integration across refuges, programs, and partners.
 - Strategy: Assist with the identification and use of appropriate partner data management repositories (e.g., eBird, National Phenology Network).
- ❖ Objective: Increase the number of refuge scientists implementing best data management practices.
 - Strategy: Assist with development and use of refuge and project data management plans and databases.
 - Strategy: Provide consultation, guidance, and training in data management.
 - Strategy: Ensure staff recognize and understand data stewardship and the data management life cycle.
 - Strategy: Ensure long-term data security through improved infrastructure and storage processes.



Photos: D. Granfors USFWS

Goal 4 – Coordination: Increase efficiency through collaboration on I&M surveys with partners within and outside the Service.

Meeting our conservation challenges across Alaska’s diverse landscape requires coordination among refuges, other Service programs, and external partners. The national I&M *Strategic Plan* (USFWS 2010a) and *Blueprint* (USFWS 2010b) direct regional branches to facilitate coordination of surveys and projects among refuges, FWS programs, partners, and LCCs. Recommendation 5 of *Conserving the Future* (USFWS 2011) advocates leveraging management capacity through partnerships with other governmental agencies, conservation groups, and private landowners. Accordingly, I&M and refuge staff will work together on refuges with similar inventory and monitoring information needs. Doing so will improve efficiency and increase the value of work conducted on individual refuges. We will work together to identify shared issues, encourage and participate in working groups to facilitate collaboration, and assist development of protocol frameworks to facilitate larger spatial inference and increase efficiency.

The I&M Branch brings additional technical expertise to Alaska refuges, increasing our ability to respond internally to critical information needs. Data managers assist with database development, metadata documentation, and archiving, enabling collaboration with partners on current and future analyses. Biometricians provide expertise in study design and analysis. I&M biologists assist refuges with monitoring program reviews to facilitate identification of priorities and efficiencies. Effectively integrating I&M staff into refuge inventory and monitoring activities provides additional capacity and expertise to address growing conservation challenges.

Cooperation at broader scales with other FWS Service programs and external partners is necessary to meet conservation challenges. Understanding the potential impacts of stressors, such as climate change and invasive species, often requires ecosystem-level approaches that require multi-disciplinary collaboration. Through effective coordination, we can more efficiently address critical information needs while contributing to conservation at local, regional, and global scales.

One of the strengths of the I&M program is the national coordination among FWS regions and HQ. I&M was designed to be coordinated nationally and implemented regionally and locally. Alaska I&M staff serve on permanent and ad hoc national coordination teams where our expertise is needed. Such coordination ensures efficient use of our time and expertise while bringing new tools and guidance to Alaska refuges.

Coordination Objectives and Strategies

- ❖ Objective: Increase coordination among refuge scientists.
 - Strategy: Facilitate collaboration among refuges to address shared priorities.
 - Strategy: Encourage development of regional or topical subject matter groups to address shared priorities.
 - Strategy: Ensure information and opportunities for intra-refuge collaboration are easily accessible (e.g., disseminate information on Alaska Refuges I&M Google site).
 - Strategy: Encourage and serve as a conduit for sharing field technical expertise.
- ❖ Objective: Increase coordination between I&M staff and refuge scientists.
 - Strategy: Ensure refuge I&M staff skills are known to refuge field staff, and field staff skills and needs are known to I&M staff.
 - Strategy: Ensure I&M staff are available to refuge staff for training, consultation, and other assistance as needed.
 - Strategy: Assist refuge staff with development and implementation of scientific tools and methods for use in surveys.
- ❖ Objective: Facilitate coordination among I&M staff, FWS programs, and external partners to meet refuge information needs.
 - Strategy: Provide support for projects that incorporate internal and external partners to meet refuge information needs.
 - Strategy: Work with other FWS programs, LCCs, and external partners to address monitoring at a landscape scale.
 - Strategy: Help refuge staff evaluate and contribute to regional, circumpolar, and global efforts that meet refuge needs and contribute to broader conservation needs of individual refuges, the NWRS, and the FWS.
- ❖ Objective: Maintain coordination with the national I&M program to benefit Alaska refuges and the Refuge System.
 - Strategy: Continue membership and participation on national teams and committees.
 - Strategy: Apply relevant resources and tools developed by other FWS I&M staff that benefit Alaska NWRS.

Goal 5 – Communication: Maximize transparency, credibility, awareness, and accountability of Alaska I&M among refuges, other FWS programs, our partnering organizations, and the public.

Effective communication is an integral part of all the preceding goals and objectives. Communication helps to ensure that we are meeting the science needs of refuges, conducting sound science, making the most of our data and data management tools, and supporting work with and among refuges and our partners.

Communication tools will vary according to the scope, target audience, and objective. Maintaining awareness of current events among refuges can be conducted through informal conference calls or websites, whereas long-term or multi-refuge planning will likely require face-to-face meetings and developing written plans. Similarly, more intensive efforts are often needed to maintain communication beyond Alaska refuge staff. Technology has allowed for more rapid and widespread global communication, but we may not be able to rely as heavily on these tools for communication among Alaska refuges because slow network speeds can limit their utility. Therefore, effective communication in Alaska requires a more diversified approach.

A central goal of communication is to provide transparency about what we do and what is outside the scope or capacity of the Alaska Refuge I&M Branch. Transparency allows others to understand why we choose to implement and support certain work and projects over others. We operate within guidelines prescribed by the national *I&M Blueprint* and *Strategy* (USFWS 2010a,b), while narrowing the focus of our work according to regional needs and our staffing and budget allowances.

The foundation of good science is communication of why and how we conduct surveys. Clearly documenting all aspects of surveys improves the science and credibility of the information we produce. This communication also fosters collaboration with our partners that can help improve surveys by ensuring the use of best practices and desired level of inference. By claiming accountability for our work and being transparent on how our time and funding are spent, we help to ensure the continuation of a critical program for refuges and our partners. Spending must be clearly linked to communicated results and products to maintain program vitality.

Communication Objectives and Strategies

- ❖ Objective: Maximize effective communication among refuge scientists.
 - Strategy: Maintain existing and seek new lines of communication with refuge field staff through both formal (e.g., face-to-face meetings, webinars) and informal (e.g., phone calls, email) avenues.
 - Strategy: Provide financial and logistical support for formal communication events.
- ❖ Objective: Maximize effective communication with other FWS programs.
 - Strategy: Report on I&M activities and accomplishments to other FWS program leads.
 - Strategy: Represent Alaska I&M on cross-programmatic initiatives and working groups, as appropriate.
- ❖ Objective: Maximize effective communication with external partners.
 - Strategy: Support I&M staff participation in LCC and partnership activities.
 - Strategy: Develop communication practices to inform partners of I&M and refuge accomplishments.
 - Strategy: Support opportunities for networking and communication of Alaska I&M accomplishments at professional workshops and conferences.



Photo: R. Dugan USFWS

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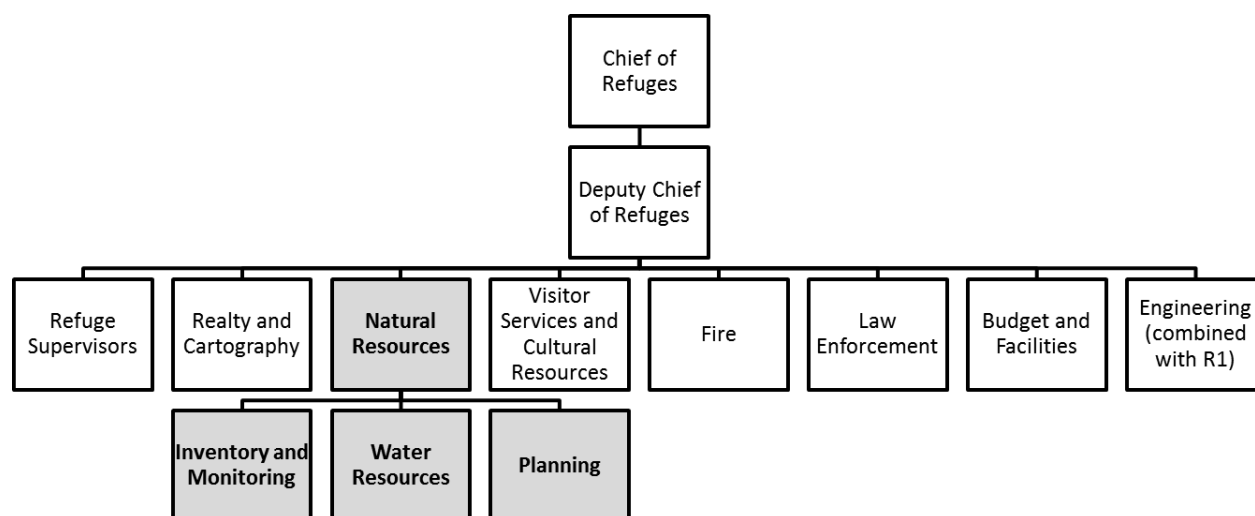
Appendix A. Inventory and Monitoring Goals for the National Wildlife Refuge System

The following are from the *Strategic Plan* and *Blueprint for Inventories and Monitoring on National Wildlife Refuges: Adapting to Environmental Change* (USFWS 2010a,b).

1. Meet the Refuge System's legal mandate to monitor the status and trends of fish, wildlife, and plant populations on refuges, preserve wilderness character, and collect and manage information needed to maintain biological integrity, biological diversity, and environmental health and preserve the character of designated wilderness within the System.
2. Advance fish and wildlife conservation at refuge and broader landscape scales in an adaptive management cycle by providing scientific information that supports conservation planning and design, guides learning through evaluation of conservation delivery, and provides a basis for assumption-driven research.
3. Implement monitoring of fish, wildlife and plants, physical resources, and ecological processes to reduce uncertainty related to impacts of climate change and other stressors; provide early warning of changing conditions; and guide development of management actions that facilitate adaptation to climate change.
4. Synthesize, interpret, and report on the condition of fish, wildlife, plants, and habitats conserved by the Refuge System in a manner that documents the contributions of the System within the context of the larger conservation estate and clearly communicates its value to the American public.
5. Enhance effectiveness and reduce costs by coordinating and integrating monitoring of natural resources at landscape scales through collaboration with other Service programs, agencies, and organizations.

Appendix B. Alaska I&M Staffing (March 2017)

Position	Current staff	Duties	Supervision
Regional I&M Coordinator and Branch Chief	Diane Granfors (Anchorage)	I&M supervision and coordination, target 50:50 Region:National duties	Natural Resource Division
Regional Biometrician and Technical Lead	McCrea Cobb (Anchorage)	Supervision of technical support, biometric support	I&M Branch
Refuge Biometrician	Jared Laufenberg (Anchorage)	Biometric support to refuges	I&M Branch – Technical group
Data Manager – 2 positions	Hilmar Maier (Fairbanks) Vacant (Anchorage)	Data management support, member of national team	I&M Branch – Technical group
Wildlife Biologist – 2 positions	Carol Damberg, Kristin DuBour (Anchorage)	Regional support for implementing national initiatives, e.g., ServCat, planning	I&M Branch
Aquatic Ecologist	Josh Rose (Fairbanks)	Regional support for water resource issues	I&M Branch
Regional Refuge Botanist	Stephen Talbot (Anchorage)	Botanical surveys, regional support for vegetation and flora issues	I&M Branch
Aquatic Ecologist (Arctic Refuge)	Greta Burkart (Fairbanks)	Conduct I&M surveys on refuge, implement national water priorities, target 30:70 Refuge:Region duties	Refuge
Botanist - seasonal (June 2016 - current)	Hunter Gravley (Anchorage)	Assist regional botanist with data collection, management, and analysis	I&M Branch



Simplified Org Chart for Alaska NWRS program showing how the I&M Branch fits with other Divisions and Branches.

Appendix C. Timeline of national and Alaska I&M milestones

Year	National	Alaska
1997	National Wildlife Refuge System Improvement Act of 1997 mandates that refuges “monitor the status and trends of fish, wildlife, and plants in each refuge” (PL105-57 111 Stat. 1256 Sec. 5(N))	
1998	Biological Needs Assessment develops 36 recommendations to improve refuge biological program.	
2004	WH8.1 Baseline inventory recommendations for refuges	
2005		A USGS Science Support Project is funded to develop a regional monitoring program on Alaska refuges, but implementation is delayed until 2007.
2006		Refuge Biologist Conference held in Homer. The group decides that Alaska refuges need a Regional I&M Plan for refuges. Policy for Scientific Peer Review and Inventory and Monitoring Plan Template approved by Regional Refuge Chief.
2007	National team convened to revise refuge I&M policy. Draft in DC waiting national review. (701 FW 2).	Refuge Biometrician (Joel Reynolds) and Kenai NWR Supervisory Biologist (John Morton) participate on I&M Policy revision team.
2008	FWS develops a 2010 over-target budget as a means to deal with climate change issues. Includes both Refuge I&M program and LCC concept. Goal is for these programs to collaborate.	Togiak Refuge Inventory and Monitoring Plan signed by Refuge Chief based on Alaska region guidance. Several other refuges completed I&M Plans under this guidance in the following years.
2009	A core team and an executive oversight committee, each comprised of biologist and managers representing all FWS regions, are commissioned to develop a vision and broad goals for the Refuge I&M program.	The Forum on Ecoregional Monitoring on Lands of the Alaska National Wildlife Refuges and Their Partners is held. It is jointly sponsored by FWS and USGS under the 2005 SSP and is summarized in two documents: Framework for Ecological Monitoring on Lands of the Alaska National Wildlife Refuges and their Partners (Woodward and Beever 2010) and Conceptual Ecological Models to Support Detection of Ecological Change on Alaska National Wildlife Refuges (Woodward and Beever 2011).
2010	The I&M Strategic Plan and Blueprint is	Each region is allowed six I&M positions. In

	completed. FWS is allocated \$12 million to develop an I&M program for refuges. The HQ office established in Ft. Collins, co-housed with NPS I&M Program. The first meeting of Regional I&M Coordinators, Data Managers, and Regional Natural Resource Chiefs is held.	Alaska, these are the I&M coordinator, two data managers (RO supervision), and three field biologists supervised by refuge stations. Positions filled in 2010 include the Data Manager (Hilmar Maier, Fairbanks), the I&M Coordinator (Diane Granfors, Anchorage), Refuge I&M Biologist Innoko NWR (Jerry Hill), Refuge I&M Biologist Tetlin NWR (Nate Berg). Supervision for the Regional Refuge Botanist (Stephen Talbot) is moved to the I&M Branch.
2011	Short term priorities are established by the Natural Resource Leadership Team (composed of the Regional Natural Resource Chiefs). These include water monitoring, phenology, and threatened and endangered species conservation. Data managers begin work on PRIMR to store metadata for refuge surveys, ServCat to store refuge documents, and the Water Resource Inventory and Analysis (WRIA) database.	The Alaska refuge supervisory biologists meet and establish three teams to address water resource monitoring, phenology monitoring, and inventories. A second data manager (Michael Cunanan, Anchorage) and an aquatic ecologist position (Greta Burkart, Arctic Refuge, Fairbanks) are filled.
2012	The I&M Core Team (I&M Coordinators and I&M NRPC staff) begins developing the 7-year Strategic Plan, the I&M Policy revision, and the Survey Protocol Handbook .	Salaries of the refuge biometricians (Anna-Marie Benson), regional refuge biometrician (Nathan Roberts), and botanist positions, previously supported by the Refuge Natural Resource Division, are transferred to I&M due to budget shortfalls. The regional refuge biometrician position is vacated. The Inventory Team recommends focusing on flora, vegetation, and arthropods. Tetlin I&M Biologist vacated and backfilled (Kristin DuBour); position moved to Anchorage in Oct 2016.
2013	The National I&M 7-year Plan is approved by the Refuge Chiefs. National priorities include IMP development, water resource inventory and monitoring, and data management. I&M pilots refuge IMPs across four regions. National I&M develops the first request for proposals.	A term botanist (Robert Lieberman, Fairbanks) is hired to lead vegetation inventories on interior Alaska refuges and begins vegetation inventories on Kanuti and Tetlin Refuges. The first I&M Needs Assessment and IMP workshops in Alaska are held at Kodiak and Selawik Refuges. The WRIA database is populated with national and regional water data for Alaska Refuges. I&M Wildlife Biologist (Carol Damberg) hired at Izembek NWR to replace Innoko I&M biologist; position moved to Anchorage in fall

		2015.
2014	The revised Inventory and Monitoring Policy 701 FW 2 is approved, with the companion Survey Protocol Handbook . Begin cross-regional team work leading to development of Pacific Seabird Program.	Kodiak IMP approved; format was adopted by the IMCT as a suggested national template. Alaska I&M contracts with ARLIS to scan and enter documents into ServCat. I&M begins support of ALMS implementation on Alaska Refuges partnering with Migratory Birds and USGS. I&M Aquatic Ecologist (Josh Rose) hired.
2015	Emphasis on development of national protocol frameworks. Conducted Refuge Needs Assessment to inform next 7-year plan. PRIMR database population and IMP development happening at varying pace across each region.	Combined Refuge Biologist and Project Leader meeting held in spring - emphasis on Refuge IMP development, need for regional GIS support, and greater regional survey coordination. The Regional Refuge Biometrician vacancy filled (McCrea Cobb) in March. Data Manager (Michael Cunanan) hired by R8 I&M toward end of calendar year.
2016	Emphasis on next iteration of a 7-year plan using a Structured Decision Making approach.	I&M team emphasis on development of Strategic Plan. Designing a Biological Monitoring Program class delivered in Fairbanks. Supervisory structure revised to include a Technical Team led by the Regional Biometrician. Refuge Biometrician (Anna-Marie Benson) hired by FES.
2017		Vacant refuge biometrician position filled in Anchorage (Jared Laufenberg).

Appendix D. Alaska I&M Strategic Plan Development

At the April 2015 Alaska Refuge Biologists meeting, a need was identified for I&M to develop a regional plan to facilitate working with refuge field scientists and to promote transparency of the I&M program direction and use of discretionary funding. The I&M Branch and Natural Resource Division had achieved a level of staffing stability that allowed for participation of the entire I&M team in plan development. We used a facilitated, structured approach, with periodic input and review from the field and regional refuge leadership.

In December 2015, the Alaska I&M team, along with the Natural Resource Division and Water Resources Branch chiefs, met in Fairbanks to begin the planning process, facilitated by Angela Matz (Fisheries and Ecological Services Field Office, Fairbanks). First, we developed a vision statement. We wanted to keep it simple while conveying the essential purpose of I&M and what we wanted for refuge science in Alaska. It was refined through many discussions based on an understanding of I&M program purposes and the Service's focus on partnerships and holistic approaches to conservation, including Strategic Habitat Conservation.

Next, we worked on objectives to guide I&M focus. We began by first stating our values: what we believed to be most important about conservation, science, the Alaskan landscape, and Alaska refuge purposes. We reviewed and considered ideas and recommendations from the *I&M Strategic Plan* and *Blueprint* (USFWS 2010a, b), Alaska's *Framework for Ecological Monitoring* (Woodward and Beaver 2010), *Conserving the Future* (USFWS 2011), and the I&M policy (USFWS 2014). We presented our initial goals and objectives through a webinar to refuge field staff for comment and review in July 2016. Responses received were considered as ideas were further clarified, edited, grouped, and sorted into the goals and objectives in this plan.

We initially attempted to develop a plan that combined objectives and prioritized actions, and took the next step of developing potential alternative actions for implementation. We brainstormed specific activities that could be undertaken to meet our objectives, resulting in a plethora of very specific actions (e.g., complete snow survey assessments), general actions (e.g., provide technical support in all areas of expertise), and large projects requiring additional expertise (e.g., complete climate change assessment reports for each refuge). We attempted to prioritize those activities by grouping them in different ways and predicting how well each action (or group of actions) would meet our goals and objectives. This prioritization is currently incomplete. Instead of further delay, we used our goals and objectives to lay the foundation for this Strategic Plan, which provides the direction for a separate 5-year Implementation Plan. Our goals and objectives are the most important part of our planning, and the separate Strategic Plan allowed for more discussion of the goals and objectives. The Implementation Plan will contain SMART objectives and prioritized actions. Developing a separate 5-year Implementation Plan separates specific actions, that may change more frequently, from goals and objectives that provide long-term direction. It also enables more opportunity for input from field stations to develop our priority actions.